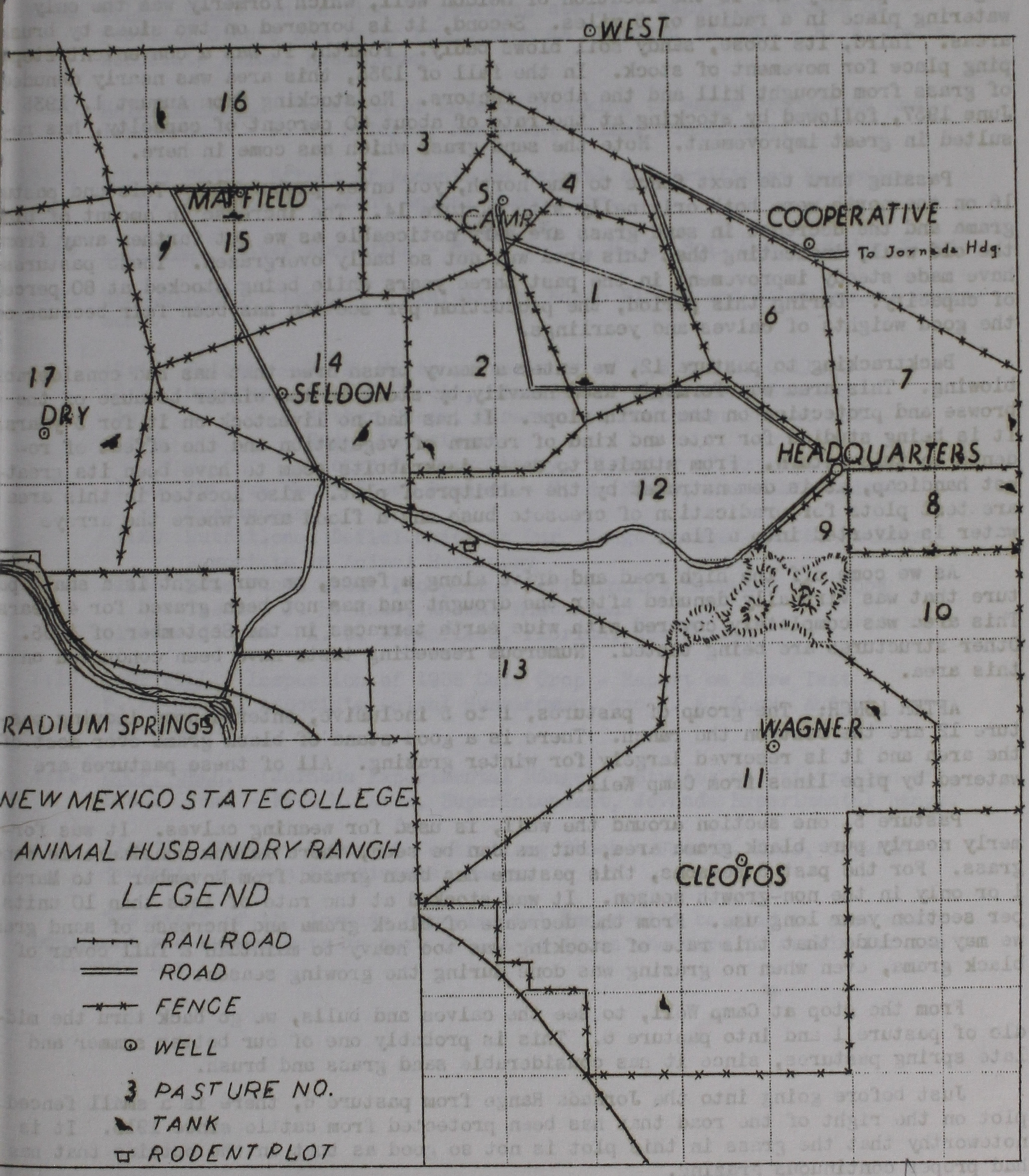
RANCH DAY

EXPERIMENTAL RANCH

New Mexico Experiment Station, New Mexico Extension Service
U. S. Forest Service, Cooperating

OCTOBER 17, 1938



THINGS TO OBSERVE ALONG THE ROUTE

Pasture 13 is entered directly after passing under the Radium Springs railroad bridge. This pasture is used entirely as an area to study the progress of natural revegetation and the effect of erosion control structures which have been installed thru the cooperation of the Soil Conservation Service. This area has not been grazed by livestock for five years. There has been improvement in the weed cover, but no noticeable increase in grass.

Pasture 14 is entered upon passing the first cattle guard. This was one of the most overgrazed areas on the ranch. Several conditions caused this severe overgrazing. The primary one is the location of Seldon Well, which formerly was the only watering place in a radius of 6 miles. Second, it is bordered on two sides by brush areas. Third, its loose, sandy soil blows badly. Fourth, it was a convenient stopping place for movement of stock. In the fall of 1935, this area was nearly denuded of grass from drought kill and the above factors. No stocking from August 1, 1935 to June 1937, followed by stocking at the rate of about 60 percent of capacity, has resulted in great improvement. Note the sand grass which has come in here.

Passing thru the next fence to the north, you enter pasture 15. This and pasture 16 on the north were both originally with pasture 14. The increase in amount of black grama and the decrease in sand grass are very noticeable as we get farther away from the old well, indicating that this area was not so badly overgrazed. These pastures have made steady improvement in the past three years while being stocked at 80 percent of capacity. During this period, the production per section has been fair because of the good weights of calves and yearlings.

Backtracking to pasture 12, we enter a heavy brush area that has had considerable blowing. This area was formerly used heavily by stock in the winter because of the browse and protection on the north slope. It has had no livestock on it for 3 years. It is being studied for rate and kind of return of vegetation and the effect of rodents on this return. From studies to date, jackrabbits seem to have been its greatest handicap, as is demonstrated by the rabbitproof plot. Also located in this area are test plots for eradication of creosote bush and a flood area where the arroyo water is diverted into a flat.

As we come off the high road and drive along a fence, on our right is a small pasture that was virtually denuded after the drought and has not been grazed for 4 years. This area was completely covered with wide earth terraces in the September of 1935. Other structures are being tested. Numerous reseeding tests have been conducted on this area.

AFTER LUNCH: The group of pastures, 1 to 5 inclusive, entered upon leaving pasture 12 are the best on the ranch. There is a good stand of black grama over most of the area and it is reserved largely for winter grazing. All of these pastures are watered by pipe lines from Camp Well.

Pasture 5, one section around the well, is used for weaning calves. It was formerly nearly pure black grama area, but as can be seen, there is now considerable sand grass. For the past 3 seasons, this pasture has been grazed from November 1 to March 1 or only in the non-growth season. It was stocked at the rate of less than 10 units per section year long use. From the decrease of black grama and increase of sand grass we may conclude that this rate of stocking was too heavy to maintain a full cover of black grama, even when no grazing was done during the growing season.

From the stop at Camp Well, to see the calves and bulls, we go back thru the middle of pasture 1 and into pasture 6. This is probably one of our better summer and late spring pastures, since it has considerable sand grass and brush.

Just before going into the Jornada Range from pasture 6, there is a small fenced plot on the right of the road that has been protected from cattle since 1915. It is noteworthy that the grass in this plot is not so good as that on the outside that has had proper continuous grazing.

PROGRAM

George Ellis, Extension Animal Husbandman, Presiding

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LEAVE LAS CRUCES 7:30 A. M. LEAVE RADIUM SPRINGS 8:00 A. M.

8:20 SELDON WELL. Inspection of yearling steers. Report on Growth of Yearling Steers and Their Production as Compared to Cows - P. E. Neale, Associate Animal Husbandman.

9:10 MAYFIELD WELL. Relation of Rate of Stocking to Range Production and Improvement - J. O. Bridges, Assistant Animal Husbandman.

10:00 RODENT PLOT. Effect of Rodents on Natural and Artificial Reseeding - J. O. Bridges, Assistant Animal Husbandman.

10:45 CONTOURS. Water spreading - R. A. Young, U. S. Soil Conservation Service.

11:30 HEADQUARTERS. Lunch - - Exhibits of Range Plants and Experimental Equipment.

12:45 Welcome - H. M. Milton, President of N.M.A.& M. College
12:55 Remarks - Fabian Garcia, Director of Experiment Station
to Arthur Upson, Director of Southwest Forest and
1:05 Range Experiment
George R. Quesenberry, Director of Extension
1:10 The New Range Sheep Project - P. E. Neale, Associate Animal Husbandman
1:20 Nutritional Deficiencies in Our Range Forage - W. E. Watkins, Associate in Animal Husbandry
1:35 Some Facts about Phosphorus Deficiencies Revealed by Blood Tests - J. H. Knox, Animal Husbandman
1:45 Address - A. D. Brownfield, Florida, New Mexico

2:15 CAMP WELL. Inspection of 1938 Calf Crop - Report on Sire Test - P. E. Neale, Associate Animal Husbandman, and J. H. Knox, Animal Husbandman.

3:15 COOP. WELL. (Jornada Experimental Range). Studies on Utilization of Black Grama - Fred N. Ares, Superintendent, Jornada Experimental Range.

4:15 ELECTRIC FENCE. Means of Controlling Stock - Fred N. Ares, Superintendent, Jornada Experimental Range.

The staff of the Jornada Experimental Range will be glad to show their equipment and experiments in more detail to those who care to remain for the following day.

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YEARLING STEERS VERSUS COWS AND CALVES

During the last three years we have kept our steer calves and run them thru the next year as yearlings. This was because we had a small breeding herd left over from the drought and subsequent poor feed in 1934 and 1935. With more feed on the ground in the fall of 1935 than was necessary for our breeding herd, we kept our steer calves instead of going out and buying new breeding stock. We thought that in this way we would increase our production from our range more economically. It also gave us greater selection in our heifer calves for replacement. The steers did so well that we wondered how they would compare in production with our calf production, so the following table has been set up:

Table I. Comparison of Gain of Yearling Steers with Calf Weight Produced by One Cow

Year	Per-cent of calf crop	Wt. of each calf produced per cow	Lbs. of calf pro-duced per cow	Wt. of year-ling steer	Gain of year-ling steer	Grazing ratio - cows to yearling steers	No. steers grazed on same feed as 1 cow	Yearling steers grazed on same feed as 1 cow	Value of calf gain at 8¢ per pound	Value of steer gain at 7¢ per pound
		lbs.	lbs.	lbs.	lbs.			lbs.		
1936	60	445	267	697	356	1 cow to .605 steer	1.6	569.6	21.36	39.87
1937	95	462	431.9	785	341	1 cow to .64 steers	1.56	531.96	34.55	37.24
1938	97	4402	427	799.8	337.8	1 cow to .55 steers	1.82	614.79	34.16	43.03
Ave.	85	449	371.9	760.6	344.9	.605 steers	1.66	572.12	30.02	40.05

The above table gives a rather large advantage to the yearling steer as a gain producer as compared with the cow. It definitely proves that when yearling steers are kept on as good a grazing area as are the cows they are as good or better gain producers as cows and, therefore, they can be used when desired in the ranch management without lowering the income from the ranch.

The three years that we have kept yearling steers have been good feed years; therefore, we had good steer gains. Had we run them in 1934 and 1935, undoubtedly we would have had a loss and would have been much better off to have sold them as calves. There is also chance for loss in price on the calf weight above the usual one-half to one cent a pound difference between calf and yearling price. The reverse is also true at times. We might say that the good range man would not run yearling steers in a poor feed year, thereby avoiding chance of loss; but can we actually tell when we are to have a poor feed year until it is over or too late in the season to check our losses?

Partly for the purpose of showing the greater production of yearling steers over cows, Table II. has been compiled for the purpose of comparing two herds grazing on the same area (a 215 grazing unit ranch), that is, both herds are balanced so they have the same feed requirements. In one herd more cows are kept and all steer calves and heifers not needed for normal replacement are sold. In the other herd fewer cows are kept and all steer calves are carried over the next year and sold as yearlings; the heifer calves not needed for replacement are sold as calves. These figures are based on the calf crop, calf weights, yearling steer weights, death loss, and cull cows that our College Ranch has had over an average of years.

Table II. Breeding Herds Comparison
One Selling All Calves with One Selling Yearling Steers

	No. cows to calves	No. calves raised St.	No. calves raised Hf.	No. calves to sell St.	No. calves to sell Hf.	Weight of calf sold Steer	Weight of calf sold Heifer	No. yr. st.	Wt. yr. steers	Wt. cull cattle sold	Total wt. sold	* Value of wt. produced
Breeding herd steers sold as calves	160	68	68	68	42	30260	18690	0	0	25000	73950	$4729.10
Breeding herd steers kept	134	57	57	0	35	0	15575	57	43434	21000	80009	$5188.06

* Steer calves .08 per pound, steer yearlings .075 per pound, heifer calves .07 per pound, cull cows .04 per pound.

The price variation used may not fit all conditions; however, we have been offered the same price for our yearling steers as for our steer calves for the past three years. The table does not show one of the greatest advantages of yearling steers, that of being able to adjust the herd numbers more quickly and easily to irregular feed conditions. For instance, after a poor growing season and little feed on the ground, steer calves can be sold and not kept for yearlings, thus reducing the units for the next year by 25 percent without selling any extra breeding stock. Also, in years when feed conditions are moderate, fewer steers can be kept. After an extra good growing season, such as this year, with above normal feed in sight, not only all steer calves but all heifer calves can be kept and in this way the number carried may be increased without buying extra stock from some rancher who also has a lot of feed during the same year. To sum up, it allows the rancher to vary his cattle numbers to suit feed conditions without changing the production of his breeding unit to any great extent. Another item not considered is the extra bull cost with straight calf production.

We do not advocate the raising of yearling steers to the exclusion of other cattle, but do feel that a good plan of management is to keep the breeding herd down to such numbers that they will always have good feed, even in rather poor feed years, and to use yearling steers and possibly yearling heifers to produce quick economical gain from the extra feed that is to be had in normal and above normal feed growth years. We feel that this plan will insure a more normal income and give best utilization of the range.

In conclusion, (1) yearling steers require 60 percent as much feed as does a cow. (2) They make good gains on this low rainfall, low carrying-capacity range and produce more gain on the same amount of feed than can a cow produce in calf weight. (3) They give a more pliable management plan to the grazing units in areas where feed conditions are as variable as in this area. (4) They are the kind of feeder needed by our western irrigated farm feeders to consume the large amount of cheap roughage and small amount of high-priced grain. (5) When fed 160 days on these feeds, they market at a weight of around 1100 pounds which is close to the baby beef limits. (6) They usually sell for less per pound live weight than calves.

Steers Grazing with Cows Versus Steers not with Cows: In 1937 and 1938, we had four steers in the mineral experiment, so they ran with cows during the summer. These four steers made an average gain of 330 pounds in 1937, compared with an average gain of the steers in separate pastures from cows of 341 pounds, giving an advantage of 11 pounds gain per steer when not running with cows. In 1938 the four steers with the cows made a gain of 334 pounds per steer and the steers not with cows of 337.8 pounds Averaging the weights for the two years, it is found that the eight steers with the cows made 332 pounds gain per steer and the steers not with the cows 339.4 pounds. This gives a very small difference of 7.4 pounds per steer in favor of running steers separate.

RELATION OF RATE OF STOCKING TO RANGE PRODUCTION AND IMPROVEMENT

I would like to discuss the stocking and production of three of our pastures, the two you have passed thru on your way from the steers up here and the one you see just to the north. These are not our best pastures, but rather the poorest of our grassland pastures. They contain 9200 acres or approximately 14 sections. Of the 9200 acres, about 2,000 which you see lying along the rim of the hills is more or less worthless except for the weeds and mesquite beans they produce. The rest of the area, as you probably noticed, is black grama and dropseed, about 60 percent grama and 40 percent dropseed. The stand of grass, while on the upgrade, is still only about one-half as heavy as our best pastures, and the proportion of dropseed is much too high.

The method of stocking that we have used might be termed limited grazing. The cattle have been on the pastures more or less yearlong but have been off for occasional periods of a month or six weeks at various times thruout the year.

The stocking on these three pastures for the last grazing season, July 1, 1937 to June 30, 1938, totaled 52 animal units. This is at the rate of a little more than 3½ to the section for the entire area or about 4½ to the section if only the grassland is considered. The stocking in these two north pastures has been about the same for the last three years, but in the pasture where you saw the steers there was no stock thru the 1935-36 season, but it has been about the same for the last two seasons. The stocking of these pastures was originally determined by a careful reconnaissance survey in 1935, which showed the capacity to be 58 head. There has been considerable improvement each of the past three years, but the stocking was purposely held at 52 units in order to allow the pastures to recover from the 1934 drought. We feel that this number is high enough to give us a fair return on the land while we are improving our pastures at the same time. Under stocking is not always a waste of money when considered from a long-time viewpoint, as will be brought out later in a discussion of actual production and the increase in carrying capacity achieved.

Our cattle are weighed several times thruout the year, so we have definite figures on the beef production of each pasture. Pasture 14 produced 4,839#, pasture 15 - 13,873#, and pasture 16 - 12,240#, or a total of 30,952#. This is at the rate of 3 1/3# per acre or 2,150# per section, if only the grassland is considered, the rate is 4.3# per acre or 2,752# per sec. of this 30,952# of beef, 4,423# was dry cows, 13,944# was calves, and 12,585# was steers. This beef, if sold at 4¢ for cows, 6¢ for steers, and 7¢ for calves, would have brought $1,908. This is at the rate of 20 3/4¢ per acre or $132.80 per section. Considering the grassland only, the return would have been 26½¢ per acre or $169.60 per section.

You will notice I have given the production in pounds per acre or per section rather than the number of calves or steers turned off per section. We believe this is an important point in measuring production, for it is the number of pounds of beef that you put on the market that counts rather than the number of head. If you have the same number of pounds of calf or steer in fewer animals, you are usually going to get more per pound than if you have it in a larger number of animals. Likewise, we believe that pounds of marketable beef produced per section is a more reliable index to the value of a range than the number of head of cattle it will support per section. In other words, it is the amount of beef you sell that counts rather than the number of cattle you have on your range.

We realize that $133 gross return per section is not high but as Southwest grazing land goes, it is probably a fair return. However, in viewing this from a long-time standpoint, we feel that the $133 per section is not the only return we have from this land. As I said before, the 1935 carrying capacity estimate was 58 head for this piece of range; an estimate made this last June and based on the amount of feed left after these 52 cattle units had grazed the area for a year gave us a carrying capacity of 77 head or a 33 1/3 percent increase over the capacity of three years ago.

This cannot be measured in money as can the pounds of beef per acre, but it is certainly worth something. The possibility that the same improvement could have been made by stocking to full capacity remains, but in view of the past weather records, this is not likely. Last year our rains did not come until the latter part of August and the first of September and most certainly we would have hurt our pastures if we had been stocked so that our grass would have been fully utilized by the end of June.

Due to the fickleness of the weather on this semi-desert type of range, we have adopted the policy of not stocking our pastures to their full carrying capacity, but to stock them so as to maintain a two months or 17 percent reserve at the end of the grazing season. I do not mean to say we have only 17 percent of our grass left on June 30, but that we have 17 percent in addition to a 25 percent reserve for reproduction purposes. The above-mentioned present carrying capacity of 77 units presupposes 25 percent of the grass being left for reproduction on June 30. Our increase in stocking will be from 52 at present to 64, which is 17 percent less than the 77 units which the land will carry.

Some may doubt the wisdom of this stocking policy, but we ask you to compare this type of range, this weight of cattle, and this return per acre to other similar ranges before making a final decision.

EFFECT OF RODENTS ON NATURAL AND ARTIFICIAL RESEEDING

This pasture we are now in contains a little over 5,000 acres. Following the 1933-34 drought, this area was stocked only lightly with eleven bulls. There was no visible recovery and on November 9, 1935, all stock were removed. Since that date, there has been no grazing of livestock in the area.

This pasture is largely of a brush type with only about 400 acres of this semi-grassland. This large amount of brush no doubt causes a concentration of jack rabbits on this area. The jack rabbit-proof plot you see here was constructed in April 1936; the grass you see is the third crop under rabbit protection. I say rabbit protection as both kangaroo rats and mice have been found inside the plot at various times.

A 1/100-acre plot, which is an area approximately 21 feet square, has been harvested in February of each of the last two years on the better portion of the inside and the best area that could be found outside. The grass was cut at a height of one inch and the air-dry material weighed. In 1937, the grass from the protected plot weighed 587.5 grams and from the plot grazed by rodents 3.5 grams. Thus rabbits by their grazing and other activities did not allow even one percent of the possible grass crop to remain standing thru the winter.

In 1938 the results were similar but with the production greatly increased. The grass from the protected plot weighed 2270 grams and from the unprotected plot 262 grams. This year the rabbits allowed about 11 percent of the possible crop to remain standing. The appearances are that next February the rabbit damage will be still less, but is likely to be over 75 percent, which is a tremendous toll.

The grass density on each of these two plots was measured at the time of cutting this year and was found to be 16 percent on the protected plot and 4.3 percent on the unprotected plot. From this, it can be seen that rabbits may hold the area of grass down to 27 percent of what it could be in two years of protection from cattle grazing, and as stated before, allow only 11 percent of the possible weight production. This would indicate that areas similar to this can be overgrazed by rabbits alone and that recovery by natural reseeding can be postponed indefinitely.

The original purpose of this plot was to give protection to some artificial reseeding plots. Nine plots were planted on the inside in the summer of 1936, and including a number of duplicates, about 60 were planted on the outside. Today four of the nine plots on the inside have living plants in them, two with very good stands considering the plant and the site. These two are blue grama and Rothrock grama. Of the sixty plots on the outside, only two have anything on them and these have only a few plants each. From this and other experiences in artificial reseeding, we have concluded that jackrabbits are almost as great a hazard to artificial reseeding as the weather itself. In attempts to reseed with valuable browse plants, such as winter fat and chamiza, rabbits have often been found to do a great deal more damage to the small seedlings than the drought.

SOME DEFICIENCIES OF RANGE GRASS

Calcium and Phosphorus

One deficiency of range grass in most areas of New Mexico is calcium and phosphorus.

Approximately 200 samples of range forage were collected from the ranges of New Mexico in September, 1932. Fifty-one percent of these grasses at maturity were low in phosphorus while 30 percent were low in calcium. This is a bad picture for a normal rainfall year. There are losses by leaching and wintering processes which deplete these stores of calcium and phosphorus to an alarmingly low level by the early spring months. Range grasses in northern New Mexico have lost 78 percent of their phosphorus. On this ranch, 66% of the phosphorus of the principal range grasses was lost between October and April 1936-37. This definitely locates a period in the early spring when the phosphorus of the range grass is very low. If cattle are to do well, extra phosphorus must be supplied during this time. The caking of cattle in these areas usually corrects the difficulty since cottonseed cake is very rich in phosphorus.

Large numbers of stockmen have been rather successfully correcting the low phosphorus condition by feeding bone black, bone meal, or calcium phosphate mixed with salt. The calcium and phosphorus are so low in some of the most important range grases by the early spring months that we simply wonder how the cattle exist. Creeps break out in some areas but in other areas the only bad results may be an unthrifty condition, lower calf crop, lightweight calves with less vitality, and poor gains in mature animals.

The argument for feeding mineral to cattle and sheep is quite convincing. It is proved by the low calcium and phosphorus content of the forage, the low blood phosphorus content of the cattle, and the good results obtained by feeding of minerals in these areas. The mineral feeds most generally used are special steamed bone meal, spent bone black, and some of the calcium phosphates. All of these furnish both calcium and phosphorus. Since phosphorus is the element most needed, it is well to warn against using ground oyster shell, ground limestone, or calcium carbonate as they contain no phosphorus. If bone meal, bone black, or cal ium phosphates are used, both the phosphorus and calcium are provided for. The feeding of oyster shell, limestone, or sulfur does not help the phosphorus deficiency; nor does the feeding of such salts as Carlsbad salt or other impure salts furnish calcium and phosphorus. They are simply salt and will not take the place of bone meal or other calcium or phosphorus mineral supplements.

Protein

Data from this ranch in 1936 showed that the principal range grasses lost from 28 to 54 percent of their protein from October to April. It is during the early spring months that the protein in the grasses is low and the condition is corrected by the feeding of cottonseed cake to range cattle.

Carotene (Vitamin A)

Vitamin A deficiency occurs when livestock eat bleached and weathered roughage. The bad results are: poor condition, lower calf crop, eye weakness, skin troubles, nervous condition, loss of appetite, sterility, and a weakened and unthrifty condition.

The black grama grass in this area remains green thruout the winter and provides ample vitamin A or carotene to satisfy the vitamin A requirements of range cattle. This is not true of dropseed grasses, tobosa, or other grasses that do not remain green during the winter and spring. This trouble can be corrected by supplying good quality alfalfa hay, silage, or good-quality pasture.

SOME FACTS ABOUT THE MINERAL REQUIREMENTS OF RANGE CATTLE REVEALED BY BLOOD TESTS

The following preliminary data are given for two groups of range cows from which blood samples have been taken each month with reference to their mineral nutrition. One of these groups received a mixture of 40% dicalcium phosphate and 60% salt. The other group received only salt in addition to the range forage.

Lot	Weight 8/9/37		Weight 11/1/37		Wt. before calving 1938	Calves born	Midsummer weight		Weight 10/4/38	
	Cow	Calf	Cow	Calf			Cows	Calves	Cows	Calves
No supplement	1089	325	1094	483	1081	12*	913	223	1080	392
Dicalcium phosphate	1056	317	1104	469	1114	11	959	270	1079	453

* One died at birth; another, shortly after.

Little adverse effects of the low phosphorus ration can be noted before November 1, 1937. This may be due in part to the fact that the grass was higher than average in phosphorus during most of this time and because a few months may elapse before animals suffer ill effects from a low phosphorus ration. The high weaning weight of the 1937 calves in the non-mineral lot and the fact that all of these cows produced rather early calves in 1938 not only indicate that the cows were not seriously affected by their ration during the first months but also that this group were normally good producers.

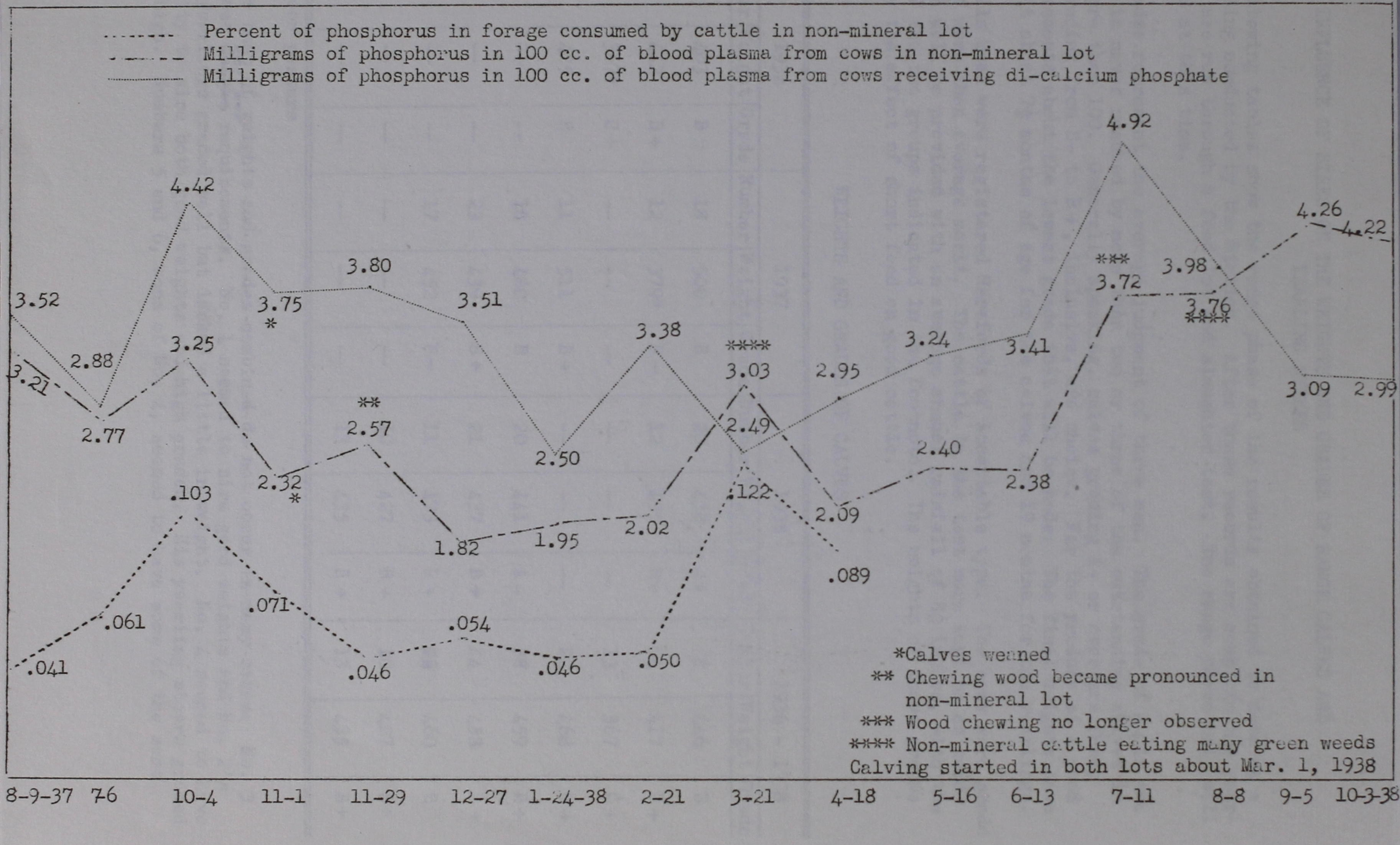
A study of the accompanying charts brings out some interesting facts. Altho it has been impossible to keep the analysis of the forage samples up to date, perhaps the most striking is the close correlation between the forage and the blood phosphorus in the non-mineral lot. The only point in the chart which does not lend itself to ready explanation is the sharp drop in blood phosphorus of the mineral lot in December 1937. The cows which received no supplement developed a marked habit of chewing sticks and bones late in the fall of 1937, which extended to July 1938. The sharp rise in forage and blood phosphorus in March was due to temporary growth and consumption of weeds following light showers. These weeds contained ten times as much phosphorus (air-dry basis) as some of the cured grasses the cattle were eating. The same abundant weed supply existed in this pasture during the late summer of 1938. The cows receiving no mineral supplement showed a marked preference for these weeds than those in the check lot. This may have been due to their appetite for phosphorus or the more abundant growth of these weeds in their pasture.

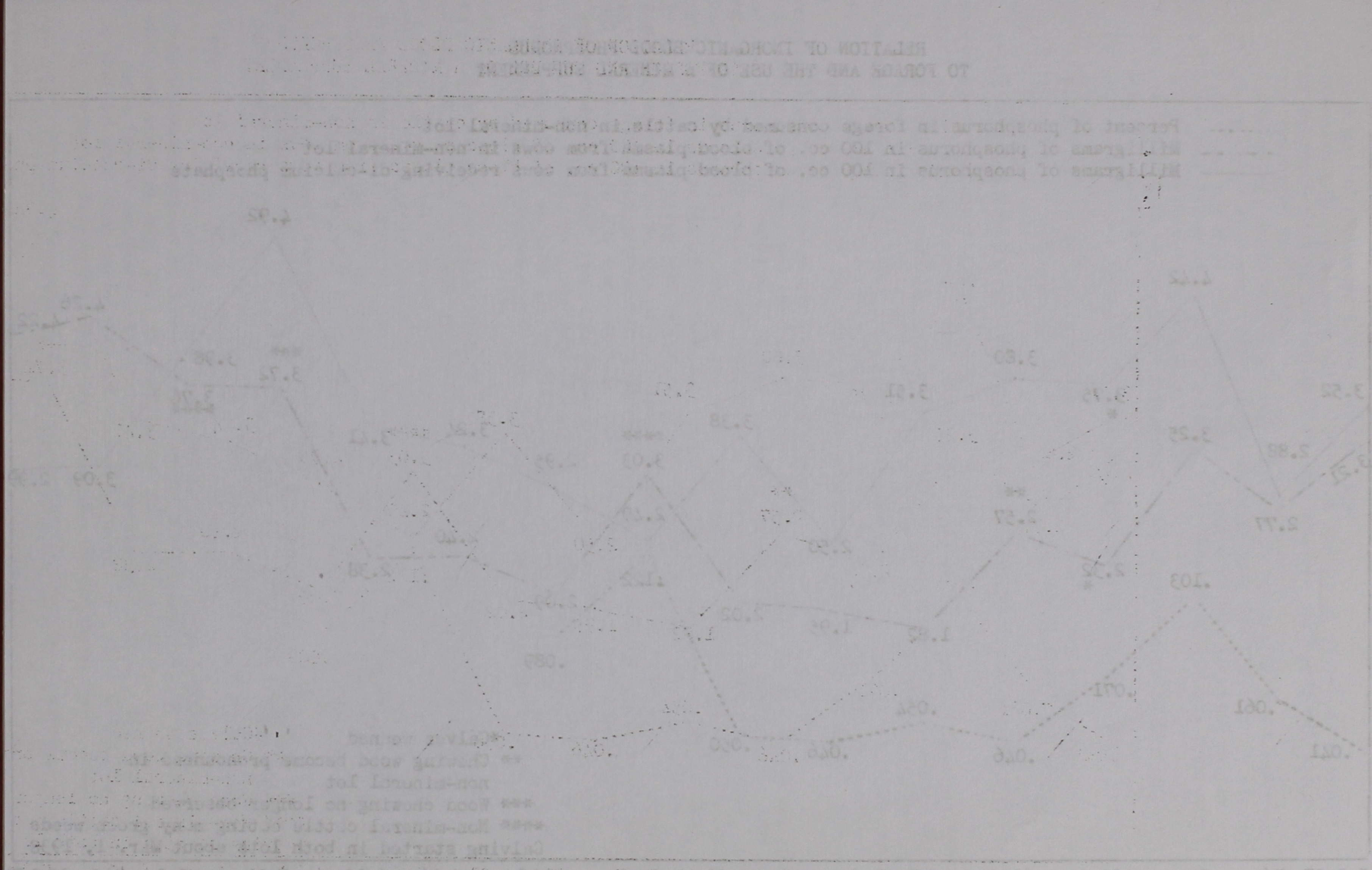
As stated above, all the cows in the non-mineral lot calved in 1938. However, one calf died at birth and one shortly after. Since these were the only weak calves in the entire crop and since all the cows in the experiment are negative to the Bang's test, it seems probable that this condition was due to the ration. Under the favorable conditions of the summer of 1938, the cows on the low-phosphorus ration quickly regained their original weight and appearance. This was not true of the calves, which remained about 60 pounds lighter than those in the other lot.

Based on the limited data available, the following negative observations have been made:

1. In the case of cattle receiving no phosphorus supplement, the inorganic phosphorus of the blood plasma paralleled closely the phosphorus content of the forage consumed.
2. The phosphorus content of grasses was much higher during growth than during dormancy.
3. The dry forage of winter and spring was much too low in phosphorus to nourish pregnant, non-lactating cows.
4. Succulent grass alone did not provide phosphorus enough for lactating cows, but may meet the requirements of dry cows and yearling steers.
5. Green weeds were much higher in phosphorus than the grasses. A mixture of succulent grass and green weeds seemed to provide enough phosphorus for lactating range cows.
6. Maintaining cows on ranges such as that used in this test may result in depraved appetites, weak calves, and low weight of calves at weaning, even during favorable years such as 1938.

RELATION OF INORGANIC BLOOD PHOSPHORUS TO FORAGE AND THE USE OF A MINERAL SUPPLEMENT





THE INFLUENCE OF SIRES ON THE WEIGHTS AND GRADES OF RANGE CALVES AND YEARLING STEERS

The following tables show the range phase of the results obtained to date on a sire test being conducted by the Station. After these records are complete the yearling steers are run through a feed lot and slaughter test. The range phase only will be discussed at this time.

The grades represent the average judgment of three men. The grade of A+ is the highest and is never reached by more than two or three of the outstanding calves in a crop of more than 100. Generally speaking, calves grading A- or over are fancy and those grading from B- to B+, inclusive, are choice. For the produce of a good herd, D represents about the lowest grade that will be made. The final weights have been taken at about 7½ months of age for the calves and 19 months for the yearlings.

The bulls used were registered Herefords of acceptable type. The cows were grade Herefords of more than average merit. The cattle in the test were kept on as good range as can well be provided with an average annual rainfall of 8½ inches, with the exception of the two groups indicated in the footnote. The weights of these groups show clearly the effect of short feed on good cattle.

WEIGHTS AND GRADES OF CALVES

Bulls	1936			1937			1938			1936 - 1938		
	Number	Weight	Grade	Number	Weight	Grade	Number	Weight	Grade	Number	Weight	Grade
No. 1	18	403	B -	18	500	B	20	438	B+	56	446	B
No. 2	10	442	B+	12	379*	B -	12	435	B+	34	417	B+
No. 3	13	367*	C+	--	--	--	--	--	--	13	367	C+
No. 4	11	425	B	11	511	B+	--	--	--	22	468	B+
No. 5	--	--	--	18	480	B	20	441	A -	38	459	B+
No. 6	--	--	--	23	439	B+	21	437	B+	44	438	B+
No. 7	--	--	--	17	452	B -	11	473	B+	28	460	B
No. 8	--	--	--	--	--	--	10	427	B+	10	427	B+
No. 9	--	--	--	--	--	--	13	435	B+	13	435	B+

* Cows on poor pasture

The best of weights and grades combined do not occur in many cases. No. 3 seemed to meet ~~weight~~ neither requirements. No. 1 seemed to sire good weights and No. 2's calves and yearlings graded well but lacked a little in weight. No. 4 seemed to have marked ability to sire both good weights and high grades. His yearling steers graded especially high. Numbers 5 and 6, sons of No. 4, seemed to have some of the same ability.

The data on yearlings have seemed to us a better indication of the merit of the sire than those on calves. The yearlings have been run in the same pasture, a condition impossible with the cows, in order to allow for breeding. In addition, the yearlings are removed from the effect of variation in milk production of their dams and the troubles which may afflict calfhood.

GAINS MADE BY YEARLING STEERS AND THEIR GRADES

	1937			1938			Average		
Bulls	No.	Gain 11½ months after weaning	Grade	No.	Gain 11½ months after weaning	Grade	No.	Gain 11½ months after weaning	Grade
No. 1	8	332	B	8	310	B+	16	321	B
No. 2	5	267	B+	5	343	B+	10	305	B+
No. 3	5	333	B-				5	333	B-
No. 4	5	357	A-	6	283	A-	11	317	A-
No. 5				8	315	B	8	315	B
No. 6				9	321	B+	9	321	B+
No. 7				5	307	B	5	307	B
Av.		323.5	B		313	B+		317	B+

There is evidence that the yearling gain may vary inversely with the weight and condition of the calves at weaning. This seems to offer an explanation for the large variation in the two year for bulls number two and four.

U. S. FOREST SERVICE

JORNADA EXPERIMENTAL RANGE

By Fred N. Ares

Utilization

The degree of utilization of forage on southwestern ranges is one of the most important factors in range management and livestock production and as such warrants considerable study and experimentation. In fact, the importance of utilization studies can hardly be over-emphasized since not only the restoration of our depleted ranges but also the maintenance of all our valuable grazing lands depends directly upon the fixing of certain standards of utilization which if adhered to will insure against that close, destructive grazing of perennial forage plants which so impairs and weakens their vitality that a high mortality is usually sustained during the frequent drought years.

Many forage plants are found on the Jornada Experimental Range, but black grama grass is considered the most valuable because it cures well on the stalk and furnishes a supply of palatable feed for grazing animals during all seasons of the year. Therefore, it was selected as the utilization indicator plant and the determination of all range use is based upon the degree of grazing found on this important species. In other words when black grama is found to be properly used, the range is considered fully utilized regardless of the degree of use found on other less palatable plants.

The following terms are used to describe the various degrees of utilization found by range examination: light use, proper use and over use.

On deferred black grama ranges light use should be found on the range at about the half way point of the season of use. The Jornada black grama ranges are used during the winter-spring season, approximately from November until June, so this degree of use will be found in February and March. Light use consists of about half of proper use or about 25 to 27% of the total volume by weight of the feed produced by the plant.

Proper use is of course the degree of utilization which will be found on well managed black grama ranges at the end of the grazing period. This, on the Jornada, corresponds to the early summer season just preceding the summer rains.

If the proper methods of stock control have been used, this degree of use should be fairly uniform over most of the range with possibly some unavoidable heavy use near watering places where cattle gather. The most effective means in use on the Jornada to minimize this uneven range utilization, is the practice of salting the range to secure proper distribution of the stock.

Proper use of the range is said to be obtained when the examiner judges that roughly about four-fifths of the flower stalks have been cropped down to a height of from 2 to 3 inches from the ground. This constitutes only about half of the total volume by weight of the herbage produced by the plant, because of the high concentration of volume in the basal portion of the plant. The portion of the plant remaining should never be considered as waste feed but a reserve highly necessary for the welfare of the plant and for drought contingencies.

It has been shown by a recently completed clipping experiment conducted over a ten year period on the Jornada that black grama cannot withstand the repeated total harvesting of its foliage. Plots which were clipped frequently during the growing season lost heavily before the fifth year of the experiment, while even those clipped only once each year and that after the growing season lost practically all plant cover before the end of the tenth year.

By way of contrast, black grama pastures 9 and 10 of the Jornada which have been conservatively used over long periods have maintained themselves in excellent condition year after year and were able to carry a herd of cattle thru the 1934 drought without supplemental feeding. Use of these pastures has always been so regulated that a reserve supply of feed is left ungrazed at the end of the growing season.

The term over use describes the state of the range when thru overstocking all the herbage has been grazed down to a height of 2 inches or less from the ground. This degree of use cannot be otherwise than harmful as the continued close cropping gives the plants no opportunity whatever to manufacture and store up the food so necessary to maintain plant vigor. Black grama depends very little upon seed for reproduction but spreads from stolons or prostrate flower stalks which take root at the joints and form new sets or tufts. Therefore, removal of all the foliage leaves the plant practically without means to reproduce itself.

Cutting Tobosa Grass for Hay

Tobosa grass grows so luxuriantly under favorable soil and moisture conditions that it is impossible for grazing animals to keep pace with it. If not used before the close of the growing season, the surplus feed left becomes so dry and harsh that stock will not eat it unless forced to do so by hunger. Besides, this left over growth, hard and woody in texture, actually hampers the stock from using the fresh, green feed produced the following year.

Because of this condition, many advocate and practice burning to rid the ground of the objectionable surplus. This of course, is an effective and easy way to remove the surplus growth, but there is a distinct possibility that continued burning may eventually result in serious damage to the plants. Besides, this practice results in waste of forage which is a very precious commodity in the southwest.

Wherever possible, tobosa grass should be grazed as summer feed, especially on ranges where deferred use of black grama is desired. But, where such use is not feasible or where the stock are unable to use all the feed produced, cutting of the tobosa grass for hay is recommended.

For the past two years, experiments in the cutting and feeding of tobosa grass for hay have been conducted on the Jornada Experimental Range. In 1937, a year of below normal rainfall, 8 acres of tobosa grass cut yielded 4 tons of hay, while in 1938, 21 tons or about .64 tons per acre were harvested from an area of about 33 acres.

The grass was cut with an ordinary McCormick-Deering mowing machine. Since there were no teams available, the machine and rake were pulled by a light truck which handled the job in a very satisfactory manner. For hauling to the stack, a hay rack was constructed on the bed of a 1½ ton truck which permitted the hauling of about 2 tons each trip. In 1937 the cost of the hay cut and hauled to the stack was $5.42 per ton which included transportation and labor. That cut in 1938 cost only $4.71 per ton. The lower costs in 1938 were due to the construction of a better frame for hauling, which reduced the number of trips.

The tobosa hay cut in 1937 was fed to cows which were on a small daily ration of cottonseed cake. The nay was not eaten readily at first, but as the winter advanced and fresh feed disappeared, the cows began to eat the tobosa with relish and continued to eat it thruout the winter and spring as long as the small supply lasted.

These preliminary results, as well as the experience of many ranchers, indicate that tobosa grass is a source of cheap emergency drought feed. Large quantities of the hay can be harvested and put up at a low cost during favorable years and later used as the necessary roughage or filler feed along with concentrates when the drought strikes. Feed costs are always excessive at such times, sometimes running as high as 25 and 30 dollars per ton for baled alfalfa hay and this combined with the high costs of concentrates, almost makes the cost of supplemental feeding prohibitive.

The Use of Electric Fences in Controlling Stock on Range

Preliminary results in the range use of one-wire electric fences on the Jornada Experimental Range indicate that such fences have possibilities as a cheap and effective means of controlling livestock on the range.

In August 1938, 3½ miles of one-wire fence was constructed around one of the large tobosa flats on the Jornada for the purpose of holding cattle on the tobosa summer feed and at the same time protect the surrounding grama grass from heavy use during the growing season. Following the heavy rains in July, the tobosa grass was green and succulent and when the fence was built, the soil was very damp. However, before the electrical unit ordered arrived, the soil had dried out thoroly and the first results on this dry soil were disappointing. About 140 yearling heifers were placed inside the enclosure and at first they passed back and forth under the wire freely. After about 5 days a light shower fell wetting the ground to a depth of about one-half inch, and following this there was no more passing back and forth under or even approaching the charged wire. A trail in the moist sand inside showed that the animals never came closer than 4 feet of the wire and salt placed near the line was approached with extreme caution and from one side only.

As a trial the yearlings were kept in the enclosure about three weeks, during which time none escaped. The wire was then taken down and the yearlings had to be driven out of the enclosure. It is believed that none would have voluntarily passed between any of the standing posts even after the wire had been let down, at least not for some time afterwards.

The chief value of such an enclosure on ranges such as the Jornada seems to be that of holding cattle on summer feed, especially where such feed areas are intermingled with and sometimes entirely surrounded by range supporting grama grass which must be reserved for winter use. For this purpose, these one-wire fences can be constructed quickly and cheaply and can be easily removed when no longer needed. Other uses suggested by the ease of construction or moving these fences are: Segregation of poison plant areas, holding non-breeding stock such as yearling heifers separate, and holding breeding cows and bulls together in an effort to increase the calf crop. The breeding period usually coincides with the summer season when it is desired to confine cattle closely as possible on summer feed areas.

The manufacturers of the electrical units or controllers, all recommend that cattle be trained by bringing them into contact with the charged wire in a corral before placing them in a range enclosure. On most ranches with large numbers of cattle to be handled this is not possible. The next best thing is to have the enclosure all ready for use and turn the stock in after the first light shower or rain. The soil remaining moist for a few days will thus permit a much better ground contact by

the animal and will intensify the electric snock to the extent that after one contact the wire will be studiously avoided thereafter.

The cost of these fences is the most attractive feature of all. The 3½ miles of fence constructed on the Jornada cost only $33.70 per mile, which included supervision, labor, wire, posts, insulators, and the electrical unit with its battery. This is contrasted with the cost of a standard 4-wire fence which sometimes runs as high as $200 per mile. The maintenance cost is very low, an ordinary 6 volt auto storage battery lasting 4 or 5 months before it is necessary to recharge. The wire must be well insulated and patrolled frequently especially when first used, to repair any short circuits or grounds. The better control units have a device by which grounds can be detected as soon they occur.

Electric fences should be used with caution to avoid possible harm to children. It is unsafe to use home-made affairs, and in no case should electric current be used direct from power or electric light lines without the use of a control device made by some reputable concern.